

Recreational Effort, Catch and Biological Sampling in Florida During the 2022 South Atlantic Red Snapper Season

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Executive Summary

This report summarizes methods and results for specialized surveys of the private boat and charter segments of the recreational fishery operating from the east coast of Florida during the 2022 recreational season for Red Snapper in the South Atlantic. Sampling activities were conducted over a single weekend in July (Friday and Saturday, July 8-9, 2022) when Red Snapper recreational harvest was open. Prior to the season opening, a paper log-sheet was mailed to charter vessel operators based in Florida that possess a federal permit for South Atlantic Snapper-Grouper, which was followed up the week after the season closed with telephone contacts to collect information specifically on Red Snapper fishing effort and catch. Final estimates are provided for both the private boat and charter segments of the recreational fishery.

An estimated $24,616 \pm 6,824$ (SE) private boat angler trips targeted Red Snapper over the two-day season, which represents a 45% decrease compared to the three-day season in 2021. Weather was likely a contributing factor. Offshore of Cape Canaveral windspeeds ranged from 6.9 to 7.7 m/s (15-17 mph) with wave heights less than 1 meter (<3.3 feet) over the two-day season, which was less favorable than the 2021 season. However, the numbers of boats estimated to target red snapper per day was comparable to recent years, which also points to the shortened season length as a significant factor contributing to the reduced fishing effort in 2022. An estimated $16,324 \pm 4,549$ Red Snapper were harvested by private boat anglers over the two-day season. In addition, federally permitted charter vessels harvested an estimated $1,582 \pm 246$ Red Snapper in 2022.

The Red Snapper harvest season also provides a valuable opportunity to collect a large volume of fishery dependent biological samples over a short period for determining size, age and sex compositions, as well as the genetic structure of the population. During the two-day season in 2022, anglers permitted FWC to collect biological samples from 1,218 Red Snapper. The mean age of Red Snapper sampled from both private boat (n=1,038) and charter (n=180) modes in 2022 was 6 years. Biological samples collected by FWC during the recreational season are making important contributions to an ongoing study conducted by the University of Florida and Texas A&M to estimate the abundance of age-2+ red snapper in the South Atlantic region (Sea Grant College Program NA20OAR4170471). Age and genetic samples collected from harvested Red Snapper are contributing to a close-kin mark recapture (CKMR) model that may be used to estimate absolute abundance, as well as an epigenetic age model that may allow fish to be aged in the future without the need for an otolith.

Section 1. Private Mode Methods

The survey design and estimation methods for private boat mode described below were developed over three years (2012-2014). Details are described by Sauls et al. (2017).

Sample Design — Off the Atlantic coast of peninsular Florida, recreational boaters must pass through one of nine navigable inlets to access Red Snapper fishing grounds in the Exclusive Economic Zone (Figure 1.1). Recreational boat traffic through each of these egress points was monitored during the season. Each day that an inlet was sampled, boat traffic was observed during one of three time periods. The morning period began at local sunrise (6:30 a.m.) and ended at 11:29 a.m., the midday period began at 11:30 am and ended at 3:29 p.m., and the evening period began at 3:30 pm and ended at local sunset (8:30 pm). Recreational vessel activity was monitored each day during one or two time periods, which were randomly selected and assigned at each inlet (2 days * 3 periods * 8 major inlets = 48 total periods). Matanzas Inlet is a minor egress point and was not monitored during the Red Snapper season. A ratio adjustment calculated from monitoring in prior seasons was applied to St. Augustine to account for the small amount of additional effort through Matanzas Inlet.

A complementary intercept survey was also conducted to interview parties as they returned from boating trips to determine whether they were fishing for Red Snapper, measure catch rates, and collect biological samples from harvested fish. Private boat launch sites adjacent to each of the 8 major inlets were randomly selected each day. The boat party interview also collected data necessary for a complete accounting of recreational fishing effort specifically for Red Snapper. During an assignment, each party that returned from a recreational boat trip was interviewed to determine the proportion that exited through inlets for the purpose of targeting Red Snapper, and the proportion of fishing trips that departed before sunrise and were not accounted for in inlet boat count survey. Field procedures for conducting trip interviews with intercepted vessels are described in reports for previous years (Sauls et al. 2013, 2014).

Estimation.—

The following steps were used to estimate total fishing effort:

- 1) The numbers of recreational boats observed exiting through each inlet during daylight hours was expanded to generate an unadjusted seasonal estimate of boat trips in the Atlantic Ocean across all inlets;
- 2) The estimated number of boat trips taken by federally permitted charter vessels (see next section) was subtracted;
- 3) The remainder was multiplied by the proportion of private recreational boat parties and non-federally permitted charter parties that reported targeting Red Snapper during intercept survey interviews;
- 4) The estimated boat trips that targeted Red Snapper was adjusted to account for additional boat parties that reported exiting through inlets before sunrise to target Red Snapper; and

5) The adjusted boat trips that targeted Red Snapper was multiplied by the mean number of anglers per intercepted boat party to get the total estimated number of angler trips targeting Red Snapper.

Landings were estimated by multiplying total effort by the mean CPUE (catch per angler trip) estimated from intercept data. Intercept data are weighted proportional to fishing effort across each inlet. A description of calculations is provided in prior years' reports and in Sauls et. al 2017.

Results

Overall, weather was generally favorable for offshore fishing during the 2022 season. Offshore of Cape Canaveral windspeeds ranged from 6.9 to 7.7 m/s (15-17 mph) with wave heights less than 1 meter over the two-day season. The numbers of boats estimated to target red snapper per day was comparable to recent years, and the shorter season length was effective for reducing fishing effort (Figure 1.2). An estimated $25,002 \pm 6,931$ (SE) angler trips targeted Red Snapper over the two-day season, which represents a 44% reduction compared to the three-day season in 2021. A total of 883 private boat parties were interviewed upon returning from trips in the ocean, and 76.1% reported fishing for Red Snapper. Overall catch per unit effort (CPUE) for landed fish was 0.663 ± 0.020 (Table 1.2), which has not varied significantly in recent years. Catch rates for harvested fish were highest between Cumberland Sound and Port Canaveral (Table 1.2). An estimated $16,580 \pm 4,621$ Red Snapper were harvested over the two days, and this estimate includes private boats and any off-frame charter vessels not included in the for-hire survey described in the next section. Harvested Red Snapper averaged 582 ± 3.82 mm fork length and 3.86 ± 0.07 kg.

For every Red Snapper harvested during the two-day season, an estimated 1.5 were released as discards. The overall discard rate was 0.986 ± 0.101 fish per angler trip and ranged as high as 1.86 ± 0.454 for the northernmost inlet to as low as 0.12 ± 0.104 for the southernmost inlet in the study region (Table 1.3). A total estimated $24,653 \pm 7,254$ (SE) Red Snapper were released during the season (Table 1.3).

Among parties that reported discarding Red Snapper in season, there has been a notable increase during recent years in the proportion that used a descender device to recompress at least some of the fish that were released (Figure 1.3). Descender device use was rarely reported (<3% of fishing parties interviewed) before the 2020 season, which is the first year a tool that is rigged and ready for use was required on board when fishing for reef fishes in federal waters. Data on descender device use was not collected in 2020 due to the covid pandemic; however, since then at least one third of fishing parties report using a descender device during the Red Snapper season (Figure 1.3). During 2022, the percentage of parties that reported using a descender device varied regionally and was highest among anglers intercepted in Port Canaveral (46.9%; Table 1.4).

References

Sauls, B. J., R.P. Cody, and A.J. Strelcheck. 2017. Survey methods for estimating Red Snapper landings in a high-effort recreational fishery managed with a small annual catch limit. *North American Journal of Fisheries Management* 37:302-313.

Table 1.1. Effort estimates for private boat mode by nearest inlet. Parameters include total numbers of boat parties intercepted, mean numbers of anglers per party, proportion of trips targeting Red Snapper, proportion of trips departing after sunrise, an estimate of total numbers of targeted boat trips, and an estimate of total numbers of targeted angler trips. All uncertainty estimates are \pm SE.

| Inlet | Number of boat parties intercepted | Mean anglers per party | Proportion of trips targeting Red Snapper | Proportion departing after sunrise | Targeted boat trips | Targeted angler trips |
|-----------------|------------------------------------|------------------------|---|------------------------------------|---------------------|-----------------------|
| Cumberland | 35 | 4.120 \pm 0.385 | 0.889 \pm 0.074 | 0.840 \pm 0.073 | 281 \pm 176 | 1,158 \pm 730 |
| Mayport | 142 | 3.944 \pm 0.134 | 0.903 \pm 0.035 | 0.648 \pm 0.043 | 795 \pm 395 | 3,135 \pm 1,559 |
| St Augustine | 135 | 4.101 \pm 0.182 | 0.821 \pm 0.047 | 0.598 \pm 0.049 | 718 \pm 440 | 2,951 \pm 1,811 |
| Ponce Inlet | 135 | 4.462 \pm 0.194 | 0.781 \pm 0.052 | 0.528 \pm 0.049 | 1,456 \pm 1,011 | 6,495 \pm 4,516 |
| Port Canaveral | 220 | 4.266 \pm 0.118 | 0.986 \pm 0.014 | 0.454 \pm 0.035 | 1,476 \pm 958 | 6,296 \pm 4,087 |
| Sebastian Inlet | 72 | 3.651 \pm 0.217 | 0.795 \pm 0.065 | 0.683 \pm 0.059 | 698 \pm 391 | 2,549 \pm 1,432 |
| Fort Pierce | 92 | 3.360 \pm 0.196 | 0.433 \pm 0.064 | 0.700 \pm 0.065 | 390 \pm 279 | 1,311 \pm 939 |
| St. Lucie | 52 | 3.000 \pm 0.364 | 0.258 \pm 0.079 | 0.727 \pm 0.134 | 240 \pm 176 | 719 \pm 532 |
| Overall | 883 | 4.067 \pm 0.067 | 0.761 \pm 0.021 | 0.663 \pm 0.020 | 6,054 \pm 1,607 | 24,616 \pm 6,824 |

Table 1.2. Mean CPUE (landings per angler trip), estimated total landings, mean weight (kg), and estimated total landings (kg). All uncertainty is expressed as \pm SE.

| Inlet | CPUE | Landings (# fish) | Mean weight (kg) | Landings (kg) |
|----------------|-------------------|--------------------|-------------------|---------------------|
| Cumberland | 0.909 \pm 0.067 | 1,053 \pm 666 | 2.001 \pm 0.175 | |
| Mayport | 0.758 \pm 0.033 | 2,378 \pm 1,186 | 3.531 \pm 0.181 | |
| St Augustine | 0.729 \pm 0.042 | 2,153 \pm 1,325 | 3.908 \pm 0.147 | |
| Ponce | 0.665 \pm 0.045 | 4,321 \pm 3,012 | 4.407 \pm 0.213 | |
| Port Canaveral | 0.725 \pm 0.029 | 4,563 \pm 2,966 | 4.290 \pm 0.108 | |
| Sebastian | 0.484 \pm 0.064 | 1,234 \pm 706 | 3.434 \pm 0.236 | |
| Fort Pierce | 0.345 \pm 0.075 | 453 \pm 331 | 2.661 \pm 0.278 | |
| St. Lucie | 0.303 \pm 0.157 | 218 \pm 178 | 5.339 \pm 0.786 | |
| Overall | 0.663 \pm 0.020 | 16,324 \pm 4,549 | 3.861 \pm 0.074 | 63,029 \pm 17,610 |
| c.v. | 0.030 | 0.279 | 0.019 | 0.279 |

Table 1.3. Mean releases per angler trip and estimated total landings \pm SE.

| Inlet | Mean Release per angler trip | Estimated Releases (numbers of fish) |
|----------------|------------------------------|--------------------------------------|
| Cumberland | 1.859 \pm 0.454 | 2,152 \pm 1,417 |
| Mayport | 1.737 \pm 0.264 | 5,445 \pm 2,801 |
| St Augustine | 0.981 \pm 0.142 | 2,894 \pm 1,807 |
| Ponce | 1.030 \pm 0.254 | 6,689 \pm 4,800 |
| Port Canaveral | 0.570 \pm 0.075 | 3,588 \pm 2,357 |
| Sebastian | 0.909 \pm 0.311 | 2,316 \pm 1,457 |
| Fort Pierce | 0.274 \pm 0.119 | 359 \pm 279 |
| St. Lucie | 0.121 \pm 0.104 | 87 \pm 82 |
| Overall | 0.986 \pm 0.101 | 24,273 \pm 7,142 |
| c.v. | 0.065 | 0.294 |

Table 1.4. Proportion of fishing parties interviewed during 2022 that reported discarding Red Snapper in-season by release method. Data were summarized for parties that reported releasing all fish at the surface without applying a barotrauma mitigation technique (surface release only), venting at least some (or all) fish released at the surface (venting), descending at least some fish (descending), or venting and descending at least some fish (venting and descending).

| Inlet | Fishing parties (n) | Surface release only | Venting | Descending | Venting and descending |
|---------------------------|---------------------|----------------------|---------|------------|------------------------|
| Cumberland Sound | 23 | 0.391 | 0.391 | 0.217 | 0 |
| Mayport | 74 | 0.338 | 0.365 | 0.216 | 0.081 |
| St. Augustine | 70 | 0.257 | 0.386 | 0.257 | 0.100 |
| Ponce Inlet | 53 | 0.396 | 0.396 | 0.132 | 0.075 |
| Port Canaveral | 81 | 0.259 | 0.272 | 0.383 | 0.086 |
| Sebastian Inlet | 21 | 0.429 | 0.190 | 0.333 | 0.048 |
| Fort Pierce and St. Lucie | 8 | 0.250 | 0.500 | 0.125 | 0.125 |
| Overall | 330 | 0.318 | 0.345 | 0.258 | 0.079 |

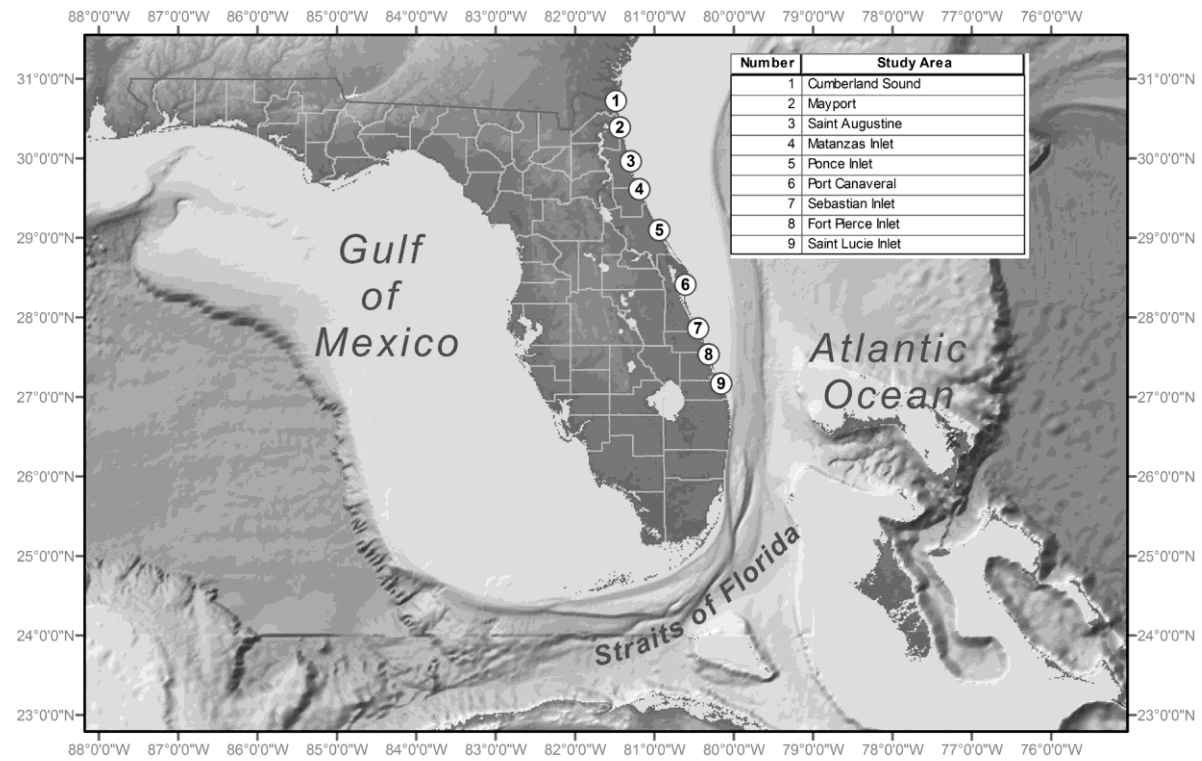


Figure 1.1. Geographic area of study and inlets included in study area.

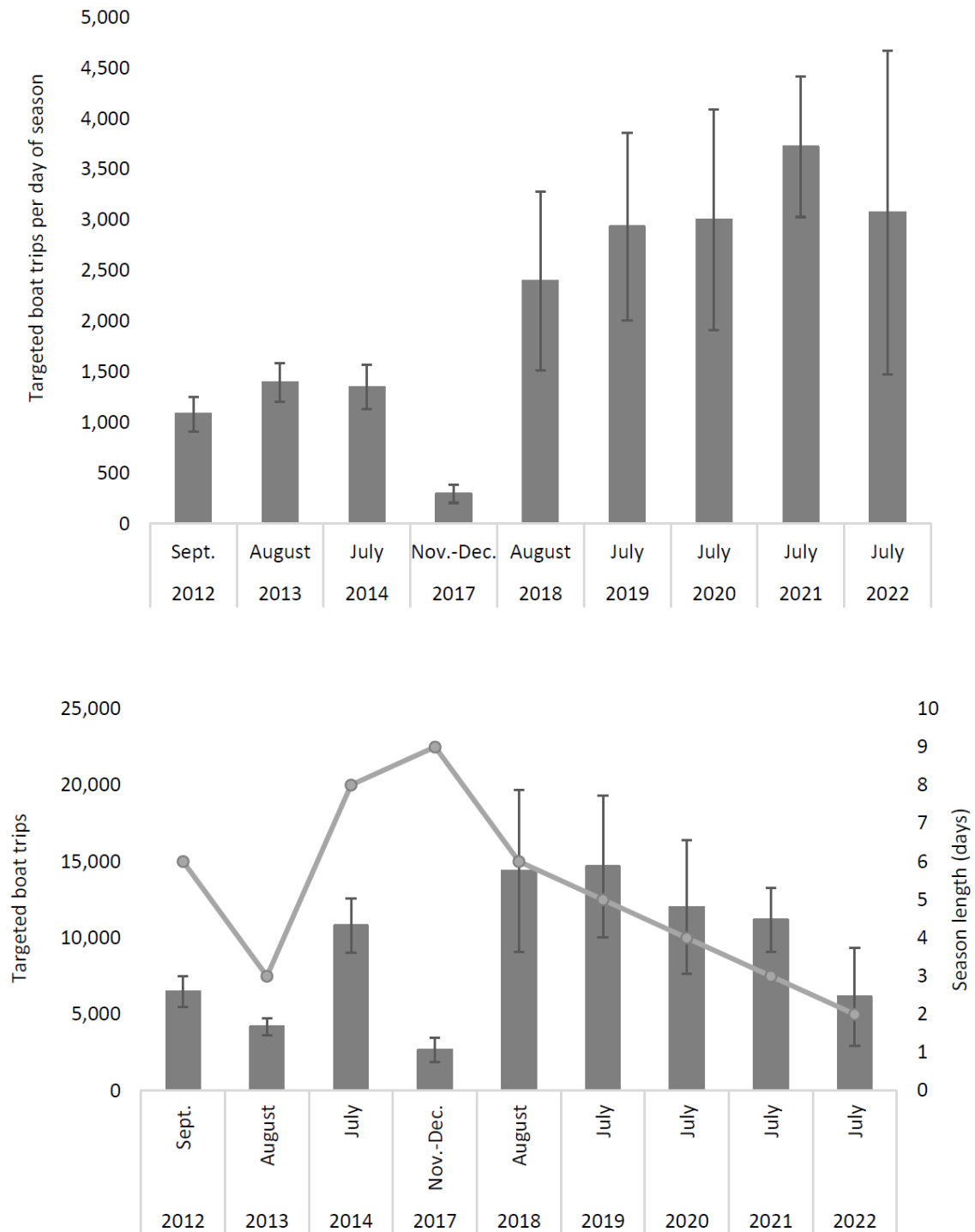


Figure 1.2. Mean boat parties per day that targeted Red Snapper during the harvest season (top panel), and total estimated boat trips with season length as a second axis (bottom panel).

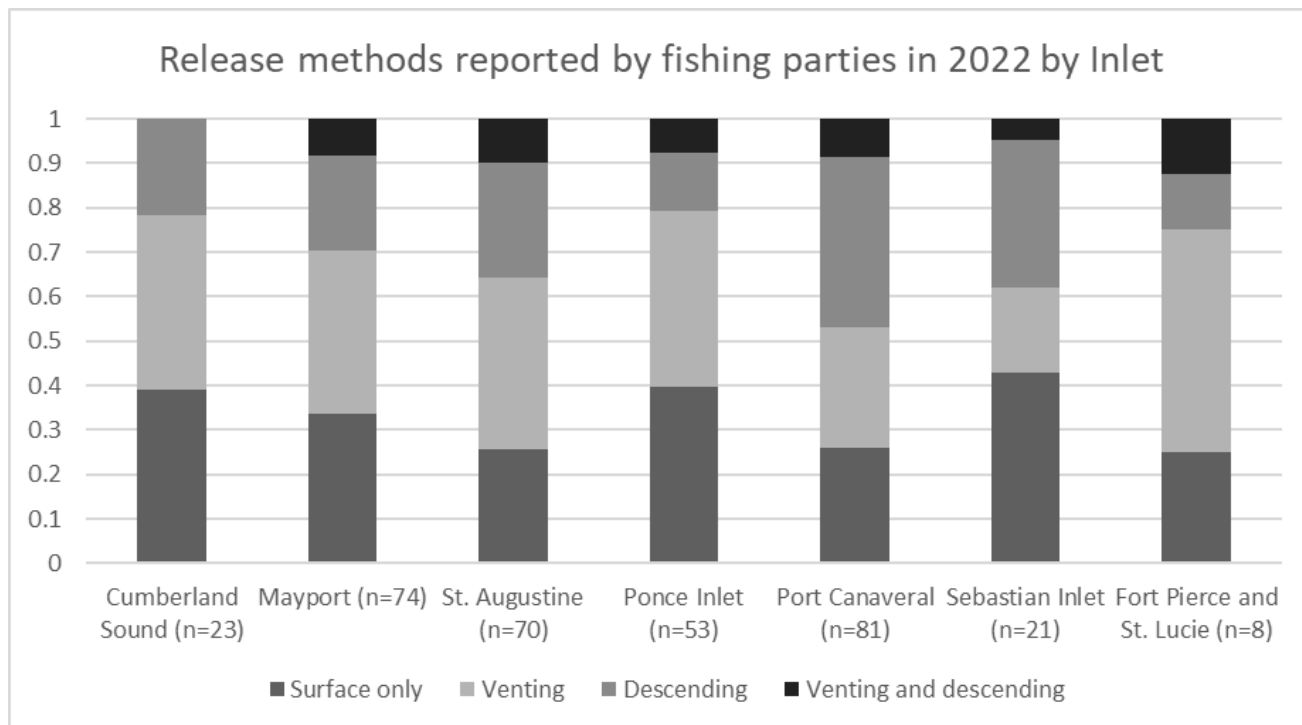


Figure 1.3. Proportion of fishing parties interviewed by year that reported either releasing all Red Snapper at the surface without applying a barotrauma mitigation technique (surface release only), venting at least some (or all) fish released at the surface (venting), descending at least some fish (descending), or venting and descending at least some fish (venting and descending). Data on release methods was not collected in 2020 during the covid pandemic.

Section 2: Charter Mode Methods

Mail / Telephone Survey — A list of for-hire vessels with federal permits in the South Atlantic is provided to FWRI each year by for the purpose of identifying the population of active charter vessels included in the MRIP For-Hire Survey (FHS) in Florida that possess a South Atlantic Snapper-Grouper permit. This population is surveyed on their fishing activity during the Red Snapper season in the South Atlantic, and responses are used to generate an expanded estimate of effort and catch. In 2022, a list of all valid federally permitted vessels was requested through Gulf States Marine Fisheries Commission, which was provided by the NOAA Fisheries Southeast Regional Office (SERO) prior to the season opening. The permit list was merged (using the vessel registration number) with an up-to-date list of active charter vessels operating in Florida. This list is maintained by FWC for NOAA Fisheries and serves as the sample frame for the telephone survey portion of the MRIP For-Hire Survey (FHS, for complete documentation: <https://media.fisheries.noaa.gov/2021-09/MRIP-Survey-Design-and-Statistical-Methods-2021-09-15.pdf>). The wave 4, 2022, directory for the FHS was used to identify the total number of known, active charter vessels in Florida that possessed valid federal permit to harvest Snapper-Grouper species in the South Atlantic during the July 2022 season. Vessels selected to participate in the FHTS (10% sampled weekly) during the South Atlantic Red Snapper season were excluded from FWC's survey, and all remaining vessels were selected to report Red Snapper trips during the 2022 season (resulting in an initial sample selection rate of 90%). After the survey was conducted, an updated file was requested from SERO to account for additional vessels that renewed their permit or obtained a new permit just prior to the Red Snapper season and thus were not included in the pre-season sample draw.

One week before the July fishing season opened, each selected vessel was sent a letter describing the intent of FWC staff to collect catch and effort data for charter trips targeting or harvesting Red Snapper. The letter explained that captains could participate in the survey by completing and returning the enclosed log sheet. If the log sheet was not returned, FWC attempted to contact vessel operators by telephone up to two weeks after the Red Snapper season. The log sheets were printed on waterproof paper to encourage captains to fill it out while on the boat to improve the accuracy of responses. A postage-paid envelope was also provided to encourage prompt return of the log sheet. The logs provided space to record trip and catch level data for up to three trips that targeted Red Snapper on each day the Red Snapper season was open, including: number of anglers, number of passengers, trip origin (state and county), distance from shore and depth fished, dock to dock hours, hours fished, and numbers of Red Snapper harvested and released (Appendix 2). Each vessel representative was called up to five times, or until a successful contact was made or their mailed log sheet was received. Vessels that did not return the log sheet or that could not be contacted by the fifth call attempt were marked as non-contacts for the fishing season.

Catch and Effort Estimation – Survey responses were used to estimate the total number of charter boat trips that targeted Red Snapper, charter angler trips that targeted Red Snapper, and numbers of fish harvested and discarded by all active federally permitted charter vessels during the South Atlantic Red Snapper fishing season. The formula used to calculate the total boat trips, angler trips, and numbers of fish harvested and released for each region and month is:

$$\hat{Y} = \sum_{i=1}^n w_h y_{h,i} \quad (2.1)$$

Where $y_{h,i}$ corresponds with the total number of boat trips, anglers, or fish reported by respondent i in region h during the two weekends when Red Snapper harvest was open. The sample weight, w_h , accounts for variable participation and survey response rates across different regions of the state and was calculated as:

$$w_h = N_h / n_h \quad (2.2)$$

Where N_h is the total number of active federally permitted charter vessels in region h , and n_h is the total number selected in region h that responded to the survey. Region 1 included permitted vessels with a home port in one of the counties on the Atlantic coast of Florida where Red Snapper are most likely to be targeted during the South Atlantic season (Table 2.1). Additionally, vessels with home ports in southeast Florida, Monroe County, and the Gulf coast of the state were treated as three separate strata in the estimation (Table 2.1). The SAS procedure, PROC SURVEYMEANS, was used for this estimation (Appendix 3), and the variance is calculated using the Taylor Series method (SAS Institute Inc., 2008).

Undercoverage Adjustment – Off-frame charter vessels that were encountered during surveys described in section 1 were included in expansions for total effort and catch in the private boat fishery (described in section 1, above). Thus, an under-coverage adjustment was not applied to the estimates of fishing effort and catch for charter mode, since this would result in an over- estimate of total recreational landings for both modes combined.

Results and Discussion: Charter Mode

An updated federal permit list was generated by SERO at the request of Gulf States Marine Fisheries Commission (GSMFC), which was provided to FWRI in April 2022. The 2022 permit file included a total of 346 for-hire vessels with a South Atlantic Snapper-Grouper permit with a homeport in Florida, which is substantially smaller than the permit list that was provided during the previous year (1,176 permitted vessels in 2021; Table 2.2). Information relayed by Gulf States Marine Fisheries Commission indicated that SERO was in the process of migrating their database to a cloud-based server when the permit file was provided in April 2022, and the file provided may not be a complete list of federally permitted vessels in Florida. This resulted in a much smaller number of permitted vessels that were initially matched to an active charter vessel in the FHTS

sample frame in 2022 compared to prior years (146 in 2022, compared to 426 in 2021). An updated permit list was obtained from SERO in January, 2023, and the numbers of permitted vessels in this file was more similar to what should be expected, based on numbers observed during the prior season in 2021 (Table 2.2). As a result of drawing the sample for the Charter survey from an incomplete list of vessels, the actual percentage of total active federal permitted vessels selected to participate in the FWC survey during 2022 was approximately 30%, as opposed to 90% (Table 2.2). This is still an acceptable sample rate for generating a robust estimate, assuming that vessels were randomly excluded from the original permit file and did not result in a biased sample frame. Taking into account the season length, charter effort in 2022 was comparable to estimates from recent years (Table 2.5).

For the 2022 charter mode survey, a total of 146 permitted vessels were selected with an overall response rate of 80.8% (Table 2.3). Estimates of boat trips, angler trips, harvest, and discards were generated for northeast Florida (Nassau to Martin Counties), and the Florida Keys (Monroe County) (Table 2.4). Overall during the 2022 season, an estimated 1,582 (\pm SE 246) Red Snapper were harvested during 266 (\pm 31) charter boat trips. Trip details provided by 29 charter vessels operating in northeast Florida reported an average fishing depth of 32.73 (\pm 13.18) meters and distance from shore of 20.90 (\pm 7.10) miles. The 2022 survey yielded two trip-level reports from the Florida Keys, and these trip reports indicate that charter trips occurred closer to shore (16.50 \pm 12.02 miles from shore), but deeper depths (45.72 \pm 21.55 meters) than northeast Florida Trips. No Red Snapper trips were reported by respondents from vessels with home ports in southeast Florida (Palm Beach to Miami-Dade Counties) and west Florida (Escambia to Collier Counties).

Table 2.1. Regional groupings of coastal counties used for generating catch and effort estimates.

| Region | Coastal Counties |
|-------------------|--|
| Northeast | Nassau, Duval, Clay, St Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin |
| Southeast Keys | Palm Beach, Broward, Miami-Dade Monroe |
| West Florida | Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, Wakulla, Taylor, Dixie, Levy, Citrus, Hernando, Pasco, Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier |

Table 2.2. Numbers of federally permitted for-hire vessels with a home port in Florida using the initial (incomplete) file received prior to drawing the sample for the July 2022 season (2022a), and after the corrected file was received in January 2023 (2022b). Numbers from the 2021 survey are shown for comparison.

| Region | Permitted vessels with a home port in Florida | | | Total matched with an active charter vessel the Florida For-Hire Survey sample frame | | |
|--------------|---|-------|-------|--|------|-------|
| | 2021 | 2022a | 2022b | 2021 | 2022 | 2022b |
| Northeast | 344 | 115 | 386 | 157 | 66 | 188 |
| 25Southeast | 174 | 38 | 131 | 53 | 15 | 50 |
| Keys | 423 | 140 | 437 | 155 | 61 | 157 |
| West Florida | 235 | 53 | 194 | 107 | 24 | 90 |
| Overall | 1,176 | 346 | 1,148 | 472 | 166 | 485 |

Table 2.3. Numbers of active permitted charter vessels selected for the survey in 2022, and associated response rates (via mail and telephone).

| Region | Vessels | Number selected | Proportion selected | Mail responses | Phone responses | Proportion response |
|--------------|---------|-----------------|---------------------|----------------|-----------------|---------------------|
| Northeast | 188 | 59 | 0.314 | 5 | 43 | 0.814 |
| Southeast | 50 | 14 | 0.280 | 3 | 11 | 1.000 |
| Keys | 157 | 51 | 0.325 | 8 | 29 | 0.725 |
| West Florida | 90 | 22 | 0.244 | 2 | 17 | 0.864 |
| Overall | 485 | 146 | 0.301 | 18 | 100 | 0.808 |

Table 2.4. Total estimated effort and catch (\pm SE) from active, federally permitted charter vessels. Most targeted boat and angler trips occurred in northeast waters (n=257 and n=1,305, respectively)

| Region | Targeted Boat Trips | Targeted Angler Trips | Total Fish Harvested | Mean weight per fish (lb.) | Total pounds landed | Total fish released |
|-----------|---------------------|-----------------------|----------------------|----------------------------|---------------------|---------------------|
| Northeast | 257 (31) | 1,304 (203) | 1,565 (246) | 4.526 (0.1537) | 6,096 (317) | 2,053 (565) |
| Southeast | 0 | 0 | 0 | | | 0 |
| Keys | 8 (5.17) | 42 (26) | 17 (15) | | | 0 |
| Overall | 266 (31) | 1,347 (205) | 1,582 (246) | | | 2,053 (565) |

Table 2.5. Mean daily charter effort in 2022 compared with prior years.

| Year | Season length (days) | Targeted boat trips | Targeted boat trips per day | Angler trips | Angler trips per day |
|------|----------------------|---------------------|-----------------------------|--------------|----------------------|
| 2022 | 2 | 266 | 133 | 1,347 | 674 |
| 2021 | 3 | 372 | 124 | 3,785 | 1,262 |
| 2020 | 4 | 592 | 148 | 2,783 | 696 |
| 2019 | 5 | 584 | 117 | 2,899 | 580 |

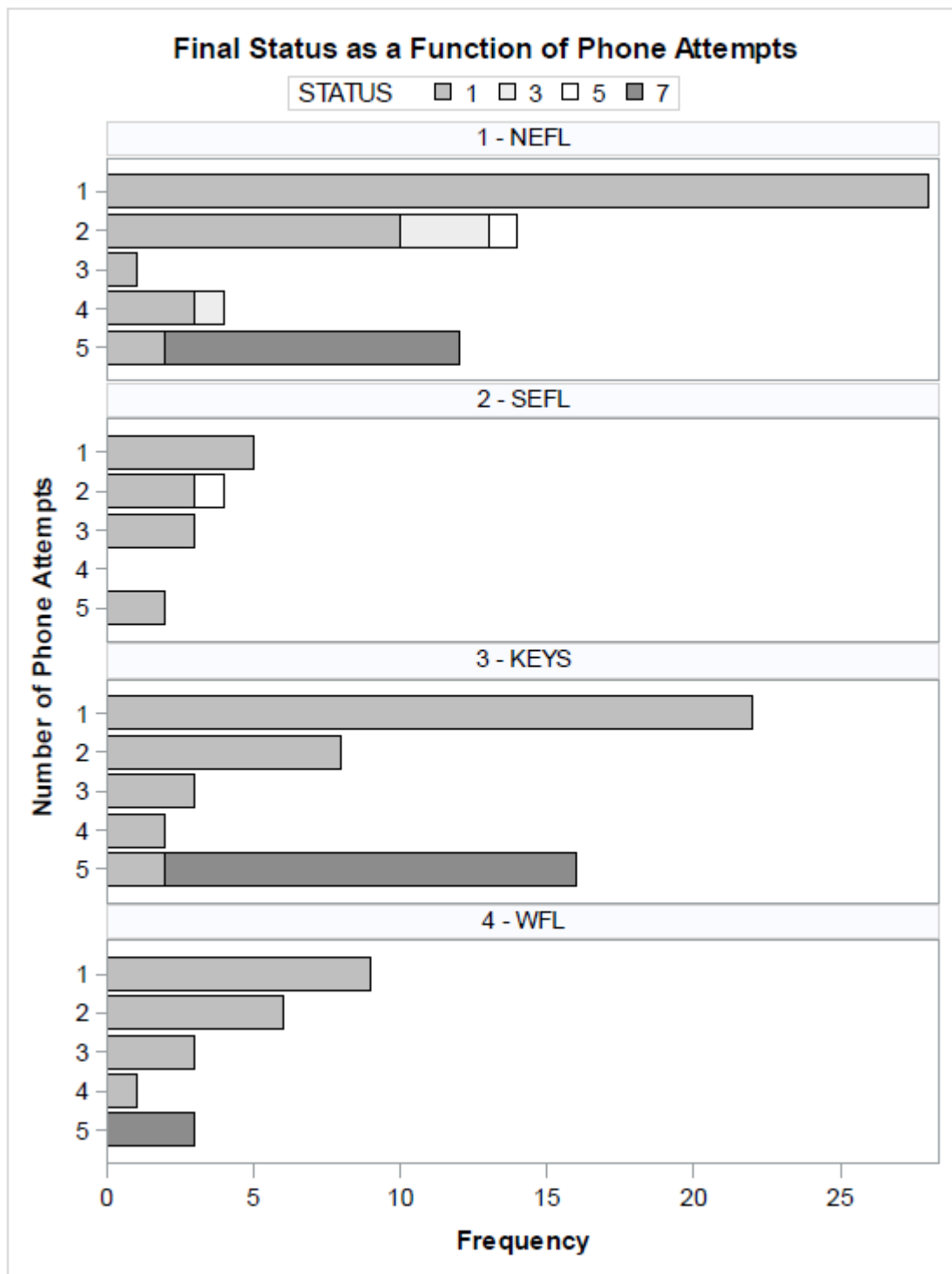


Figure 2.1. Frequency of attempted phone calls to federally permitted charter representatives, as a function of the status after the final call. Status Codes: 1=Complete interview, 2=Incomplete, but all key questions answered, 3=Refusal, 4=Language barrier, 5=Mid-Interview refusal, 6=Ineligible, 7=Unable to Contact, 8=Inactive.

Section 3. Biological Sampling

Methods

The Red Snapper harvest season provides an opportunity to collect fishery dependent biological samples from a species with a very short open season. Biological samples were collected from both the private boat and charter boat fisheries (described above in Section 1). Each fish was measured (at midline in mm), weighed (kg), and one otolith was extracted for ageing. In addition, a small section of the pelvic fin was taken for use in an ongoing close-kin mark-recapture study in collaboration with Texas A&M and University of Florida.

To account for varied sampling rates across inlets in the study area, sample weights were calculated. For private boat catch, sample weights were calculated for each inlet as:

$$w_h = \hat{C}_h / n_h \quad (3.1)$$

where \hat{C}_h is the estimated landings for inlet h (reported in Table 1.3), and n is the number of fish sampled in inlet h (reported in results section below). Sample weights for each inlet were used to calculate an overall weighted mean for fork length (in mm) and kilograms for landed fish (using the survey means procedure in SAS). The sample weights for fish in each 1 cm length bin were also summed and divided by the sum of all sample weights (equal to total estimated landings) to calculate the weighted proportion of fish in each size category.

Red Snapper otoliths were assigned a unique sample number and associated data entered into the central database for fishery dependent biological samples housed at FWRI. Data are stored on a secure network that is routinely backed up. Otoliths collected during the 2022 season were sectioned and aged in house at FWRI's Age and Growth Lab. Fin clips taken for genetic analysis were shipped to the Marine Genomics Lab at Texas A&M University – Corpus Christi as a part of the South Atlantic Red Snapper Research Project. All resulting biological data will be shared with analysts from the NMFS Southeast Fisheries Science Center for the next SEDAR stock assessment update.

Results

Biological Samples Collected

Measurements, weights, age structures and fin clips were collected during intercept assignments from both the private boat and charter fisheries. Sample sizes for numbers of Red Snapper measured, weighed, sampled for age and growth, and genetics are provided in Table 3.1. The length frequency of fish harvested by private boat anglers and charter boats is shown in Figure 3.1. Red Snapper sampled from the private boat fishery (including off-frame charter trips) had a mean length of 562.43 mm (SE=3.08) and mean weight of 3.64 kg (SE=0.06). Red Snapper sampled from charter boats that were included in the charter survey averaged 593.99 mm (SE=6.41 mm) and 4.17 kg (SE=0.13). The mean age of Red Snapper sampled was 6 years and did not vary

by mode (n=1,038 private mode, n=180 charter mode).

Table 3.1. Numbers of fish sampled from private boat and charter boat trips.

| PRIVATE BOAT | | | | |
|-----------------------|--------------|------------|--------------|-----------------|
| Inlet | Lengths | Weights | Otoliths | Genetic Samples |
| Cumberland | 51 | 51 | 51 | 51 |
| Mayport | 189 | 182 | 189 | 188 |
| St. Augustine | 252 | 246 | 251 | 252 |
| Ponce Inlet | 98 | 96 | 98 | 97 |
| Port Canaveral | 191 | 183 | 191 | 191 |
| Sebastian Inlet | 73 | 73 | 71 | 73 |
| Fort Pierce Inlet | 140 | 119 | 142 | 136 |
| St. Lucie Inlet | 44 | 38 | 44 | 44 |
| <i>Total</i> | <i>1,038</i> | <i>988</i> | <i>1,037</i> | <i>1,032</i> |
| CHARTER BOAT | | | | |
| Cumberland | 23 | 23 | 23 | 23 |
| Mayport | 15 | 15 | 15 | 15 |
| St. Augustine | 81 | 66 | 81 | 81 |
| Ponce Inlet | 37 | 37 | 37 | 32 |
| Port Canaveral | 14 | 14 | 14 | 14 |
| Sebastian/Fort Pierce | 10 | 10 | 10 | 8 |
| St. Lucie Inlet | | | | |
| <i>Total</i> | <i>180</i> | <i>165</i> | <i>180</i> | <i>173</i> |

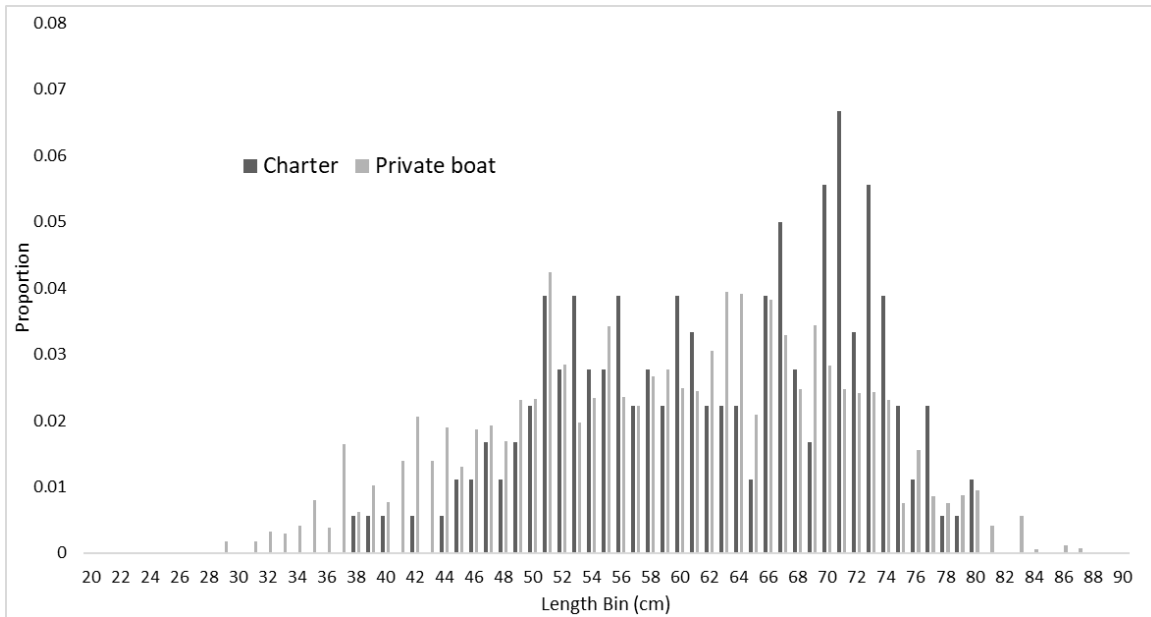


Figure 3.1. Size distribution of harvested Red Snapper sampled from private boat and charter boat trips sampled during 2022. Samples from private boats are weighted proportional to total estimated landings for each inlet.

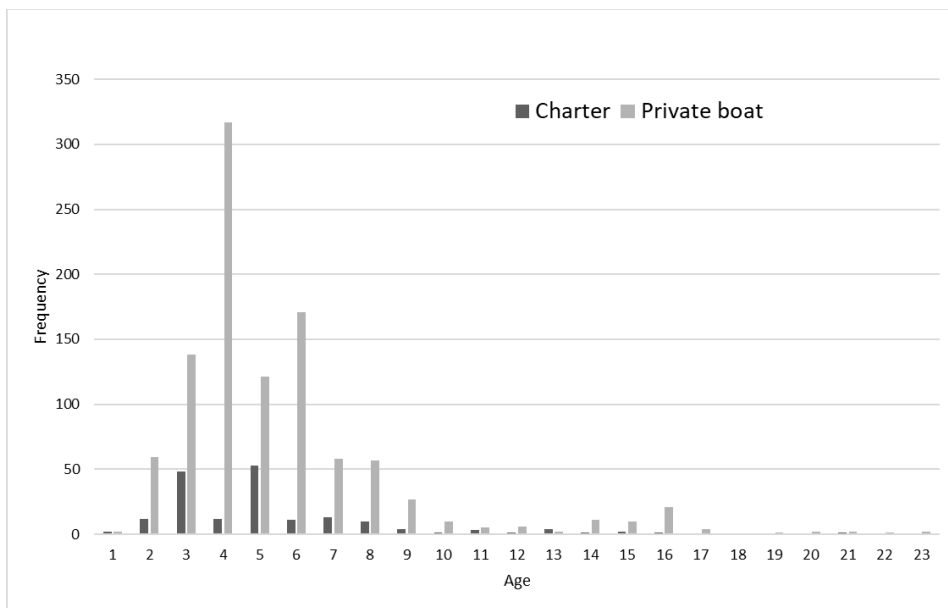


Figure 3.2. Numbers of fish sampled by age. The highest frequency in charters falling in the five-year range, private boats showed highest frequency amongst four-year range.

Appendix 1. Log sheet send to federally permitted charter representatives the week prior to the South Atlantic Red Snapper season opening.

Florida – Red Snapper Survey Log

Vessel Name:

Vessel Number:

Did you participate in the 2022 South Atlantic Red Snapper Season (Trips where you **kept**, **released** or **tried to catch** Atlantic Red Snapper)? YES NO

Did you return your log sheet to Fish and Wildlife Research Institute with the self-addressed postage paid envelope provided? YES NO

If you did participate in the 2022 the season (and you have not yet turned in your log sheet, would you please answer some questions about your fishing trips where Atlantic Red Snapper were **targeted**, **harvested**, or **released at sea**.

| Date | Day of Week | Trip No. | Trip Type (Charter, Headboat, or Other) | No. of Anglers | No. in Party | Origin of Trip | | Miles from Shore (range) | Miles from Shore (majority of trip) | Depth Fished (majority of trip) | Time Trip Started (24hr) | Time Trip Ended (24hr) | Time Spent Fishing (nearest half-hr) | No. of Atlantic Red Snapper Kept | No. of Atlantic Red Snapper Released |
|----------|-------------|----------|---|----------------|--------------|----------------|--------|--------------------------|-------------------------------------|---------------------------------|--------------------------|------------------------|--------------------------------------|----------------------------------|--------------------------------------|
| | | | | | | State | County | | | | | | | | |
| 7/8/2022 | FRI | 1 | | | | | | | | | | | | | |
| 7/8/2022 | FRI | 2 | | | | | | | | | | | | | |
| 7/8/2022 | FRI | 3 | | | | | | | | | | | | | |
| 7/9/2022 | SAT | 1 | | | | | | | | | | | | | |
| 7/9/2022 | SAT | 2 | | | | | | | | | | | | | |
| 7/9/2022 | SAT | 3 | | | | | | | | | | | | | |

Comments:

Appendix 2. The PROC SURVEYMEANS code used in SAS to generate the estimated number of charter boat trips that targeted Red Snapper, charter angler trips that targeted Red Snapper, and numbers of fish harvested and discarded by active federally permitted charter vessels during the 2022 South Atlantic Red Snapper season.

```

*calc estimates for trips taken, number of total anglers, number of fish harvested, and number of fish released;
proc surveymeans data=merg2 total=population sum sumwgt varsum cvsum;
  strata region;
  var rf_trips anglers num_harv num_rel;
  weight w;
  domain region;
  ods output StrataInfo=stratainfo statistics=stats domain=domainstats;
run;

```

